Manufacturing TRAINING

BALLANTINE

AC ELECTRONIC VOLTMETER

MODEL 300 SCHEMATICS

2

BOEING AIRPLANE COMPANY

INSTRUCTIONS FOR

AC ELECTRONIC VOLTMETER

MODEL 300

0310

BALLANTINE LABORATORIES, INC.
BOONTON, NEW JERSEY

CONTENTS

	Page
Specifications	2
General	3
General Circuit Description	3
Operation	3
Input Impedance	4
Overload Characteristics	4
Effect of Wave Form	5
Measurement of Line Frequency Voltages	5
Scale Range Adjustment	5
Use As An Amplifier	6
Measurement of Voltages Over 100 Volts	7
Measurement of Voltages Below One Millivolt	7
Use As A Microammeter	7
Servicing	7

SPECIFICATIONS

BALLANTINE MODEL 300
ELECTRONIC AC VOLTMETER

Frequency Range

10—150,000 cps

Voltage Range

1 millivolt to 100 volts rms in 5 decade ranges
(.01, .1, 1, 10 and 100 volts full scale)

Accuracy

2% up to 100 kc; 3% above 100 kc

Input Impedance

500,000 ohms shunted by a capacity of 30 $\mu\mu$f

Stability

Changes with variation in power supply voltage from 110 to 120 volts about 1%.

Scales

Logarithmic voltage scale reading from 1 to 10; auxiliary scale in decibels from 0 to 20. Each meter is hand calibrated.

Tubes

One 6J7, two 6SJ7, one 6H6, one 6X5 and two 991.
All tubes are supplied.

Amplifier Characteristics

Maximum voltage gain of 70 db; maximum output voltage is 30, output impedance is 15,000 ohms at maximum gain.
Flat within 1 db

Power Supply

110-120 volts, 50-60 cycles. 30 watts.

Dimensions

4½" high, 5¾" wide, 11" long

Weight

9½ pounds

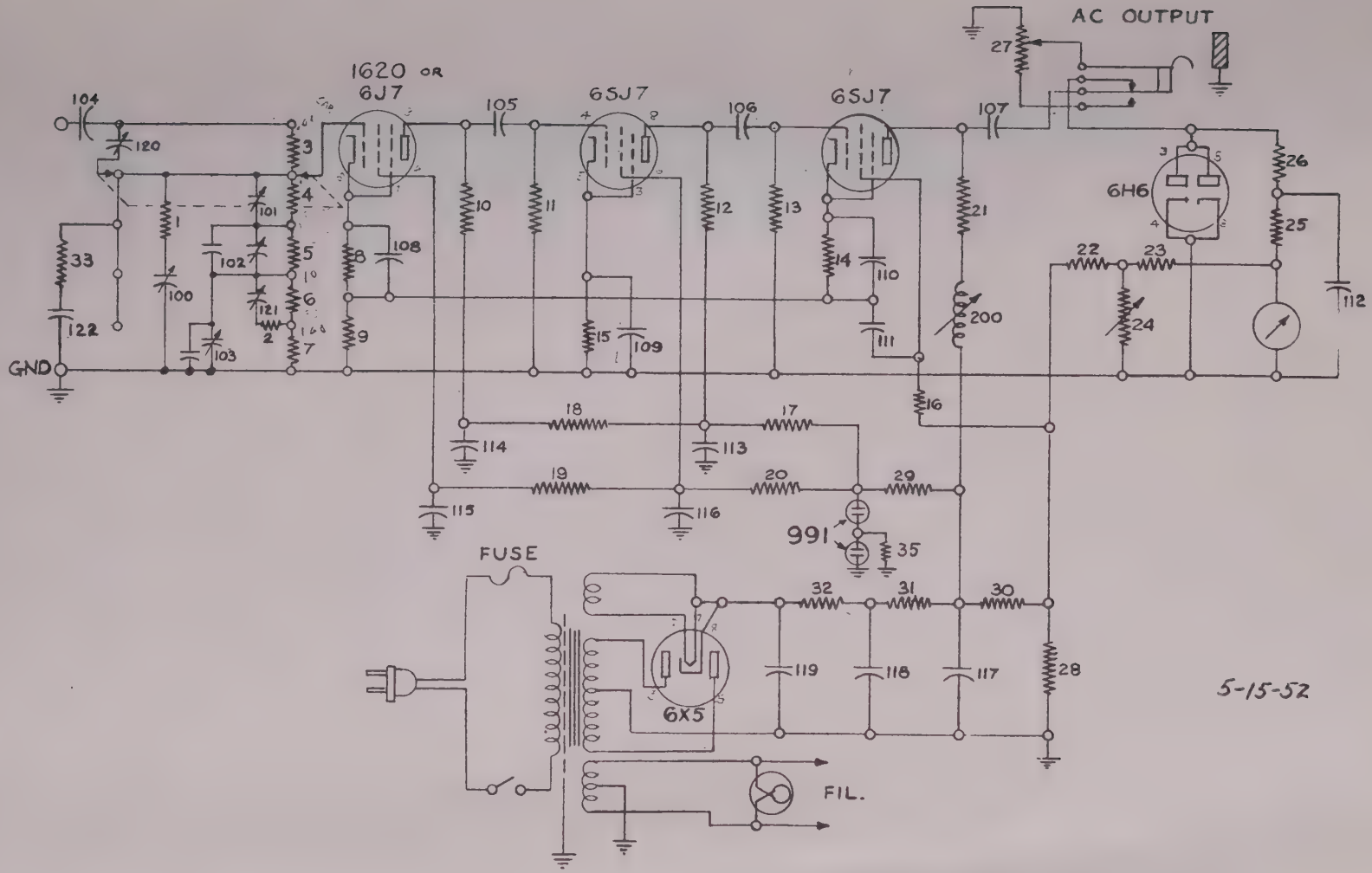
MEASUREMENT OF VOLTAGES OVER 100 VOLTS — Multipliers are available to extend the range of the voltmeter to voltages above 100. The Model 1300A Multiplier extends the range by a factor of 10 up to 1,000 volts maximum. This has an input impedance of 5 megohms shunted by 8 $\mu\mu$f. The Model 1300B Multiplier extends the range by a factor of 100 to 10,000 volts and has an input impedance of 40 megohms shunted by 3 $\mu\mu$f.

MEASUREMENT OF VOLTAGES BELOW ONE MILLIVOLT—When voltages below one millivolt are to be measured we recommend the use of the Ballantine Decade Amplifier. This provides gains of exactly ten times or one hundred times and when connected ahead of the Model 300 Voltmeter permits measurements down to values as low as 20 microvolts.

USE AS A MICROAMMETER—By using Ballantine Type 600 Precision Shunt Resistors in conjunction with this voltmeter, sinusoidal currents from 1 ampere down to 1 microampere can be measured over the frequency range from 10 to 150,000 cycles.

SERVICING — Servicing of this instrument by the user is not recommended except for the renewal of the fuse, pilot light and tubes. If trouble develops it is recommended that it be returned to us for servicing. **Before doing this the trouble should be described to us by letter,** after which shipping instructions will be furnished. The wiring in the instrument should not be tampered with because the calibration of the instrument depends critically on the position of certain wires.

MODEL 300 ELECTRONIC VOLTMETER



REFERENCE LIST OF PARTS *

Part No.	RESISTORS		
1 -	51,000 ohms, Type EB,	5%,	Allen-Bradley Company
2 -	390 ohms, Type EB,	5%,	Allen-Bradley Company
3 -	450,000 ohms, Type 172-BX,	½%,	Shallcross Manufacturing Company
4 -	45,000 ohms, Type 172-BX,	½%,	Shallcross Manufacturing Company
5 -	4,500 ohms, Type 172-BX,	½%,	Shallcross Manufacturing Company
6 -	450 ohms, Type 172-BX,	½%,	Shallcross Manufacturing Company
7 -	,50 ohms, Type 7525,	½%,	Shallcross Manufacturing Company
8 -	2,000 ohms, Type EB,	5%,	Allen-Bradley Company
9 -	3.9 ohms, Special,		Ballantine Laboratories, Inc.
10 -	50,000 ohms, Type 180,	1%,	Shallcross Manufacturing Company
11 -	360,000 ohms, Type EB,	5%,	Allen-Bradley Company
12 -	47,000 ohms, Type EB,	5%,	Allen-Bradley Company
13 -	470,000 ohms, Type EB,	5%,	Allen-Bradley Company
14 -	390 ohms, Type EB,	5%,	Allen-Bradley Company
15 -	2,000 ohms, Type EB,	5%,	Allen-Bradley Company
16 -	47,000 ohms, Type EB,	5%,	Allen-Bradley Company
17 -	20,000 ohms, Type EB,	5%,	Allen-Bradley Company
18 -	20,000 ohms, Type EB,	5%,	Allen-Bradley Company
19 -	20,000 ohms, Type EB,	5%,	Allen-Bradley Company
20 -	100,000 ohms, Type EB,	5%,	Allen-Bradley Company
21 -	38,000 ohms, Type 188-BX,	1%,	Shallcross Manufacturing Company
(22) -	1 megohm, Type EB,	5%,	Allen-Bradley Company
23 -	100,000 ohms, Type EB,	5%,	Allen-Bradley Company
24 -	20,000 ohms, Type Q Volume	Control,	International Resistance Co.
25 -	1,000 ohms, Type EB,	5%,	Allen-Bradley Company
26 -	50,000 ohms, Type 180-BX,	1%,	Shallcross Manufacturing Company
27 -	20,000 ohms, Type Q Volume	Control,	International Resistance Co.
28 -	62,000 ohms, Type GB,	5%,	Allen-Bradley Company
29 -	30,000 ohms, Type GB,	5%,	Allen-Bradley Company
30 -	20,000 ohms, Type GB,	5%,	Allen-Bradley Company
31 -	4,800 ohms, Type X2,	5%,	Continental Carbon Co., or
	4,700 ohms, Type BW-2,	5%,	International Resistance Co.
32 -	4,800 ohms, Type X2,	5%,	Continental Carbon Co., or
	4,700 ohms, Type BW-2,	5%,	International Resistance Co.
33 -	3 megohms, Type EB,	10%,	Allen-Bradley Company
35 -	470,000 ohms, Type EB,	10%,	Allen-Bradley Company

* See attached Wiring Diagram.

6/1/52
NEW ATT.

REFERENCE LIST OF PARTS *

Part No.		CONDENSERS	
100	-	50 mmfds. maximum,	Centralab Type 823Z or 822AN
101	-	65 to 340 mmfds.,	El-Menco No. 303
102	-	550 to 1600 mmfds.,	El-Menco No. 309; plus a 1000 mmfds. Cornell-Dubilier Type 1W condenser in shunt
103	-	550 to 1600 mmfds.,	El-Menco No. 309; plus a Sprague 67P10304 and a Cornell-Dubilier 1W in shunt
104	-	.1 mfd., 400 volt,	Sprague Type 67P10494
105	-	.1 mfd., 200 volt,	Sprague Type 67P10492
106	-	.1 mfd., 400 volt,	Sprague Type 67P10494
107	-	.5 mfd., 400 volt,	Astron Type ML-4-5
108	-	25 mfds., 25 volt,	Sprague Type DPE
109	-	25 mfds., 25 volt,	Sprague Type DPE
110	-	25 mfds., 25 volt,	Sprague Type DPE
111	-	20 mfds., 250 volt,	Sprague Type DPE
112	-	25 mfds., 25 volt,	Sprague Type DPE
113	-	20 mfds., 250 volt,	Sprague Type DPE
114	-	20 mfds., 250 volt,	Sprague Type DPE
115	-	20 mfds., 250 volt,	Sprague Type DPE
116	-	20 mfds., 250 volt,	Sprague Type DPE
117	-	8 mfds., 450 volt,	Sprague Type DPE
118	-	8 mfds., 450 volt,	Sprague Type DPE
119	-	2 mfds., 600 volt,	Cornell-Dubilier Elec. Corp. Type T-6020
120	-	25 mmfds., maximum,	Centralab Type 823-Z
121	-	100 to 550 mmfds.,	El-Menco Type 304
122	-	4.7 mmfds.,	Stackpole Type GA-6

200 - 35 millihenry, max., iron core choke, Ballantine Laboratories, Inc.

TUBES - One Type 6J7 or 1620, RCA or equal
Two Type 6SJ7, RCA or equal
One Type 6H6, RCA or equal
One Type 6X5, RCA or equal
Two neon lamps, type 991, RCA or equal
One pilot light, 6.3 volt, .150 amp., bayonet

METER - Special type obtained from Ballantine Laboratories only

FUSE - 3/4 ampere, type 8-AG, Littelfuse Inc., or equal

TRANSFORMER - Type A-326F, Ballantine Laboratories, Inc.

* See attached wiring diagram.

5/15/52
NEW ATT.

www.manualsplus.com
1014831